

For Automotive  
I<sup>2</sup>C-Bus INTERFACE REAL TIME CLOCK MODULE



RA - 8581 SA

- Built-in frequency adjusted 32.768 kHz crystal unit.
- Interface Type : I<sup>2</sup>C-Bus Interface (400 kHz)
- Operating voltage range : 1.8 V to 5.5 V
- Wide Timekeeper voltage range : 1.6 V to 5.5 V
- Low backup current : 0.45 μA / 3 V (Typ.)
- 32.768 kHz frequency output function : C-MOS output With Control Pin
- The various functions include full calendar, alarm, timer.

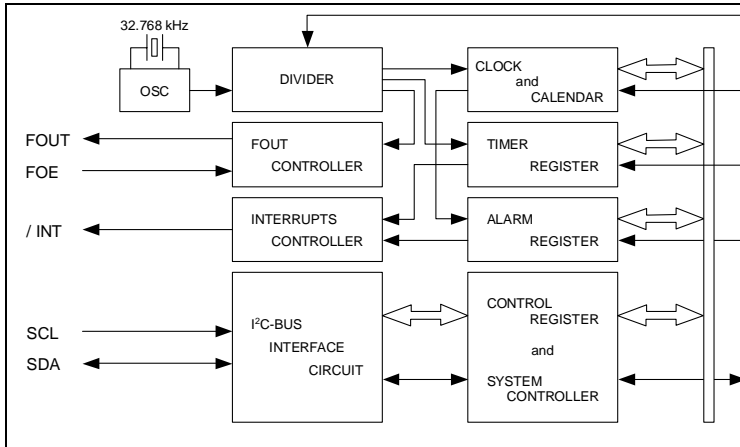
\* The I<sup>2</sup>C-Bus is a trademark of NXP Semiconductors



Actual size



Block diagram



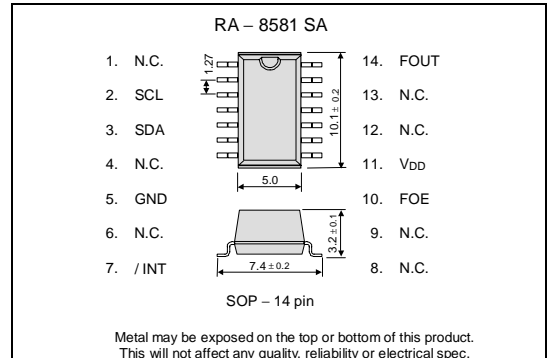
Overview

- **Interface Type**
  - I<sup>2</sup>C-Bus interface. ( Hi-speed bus specifications 400 kHz )
  - \* I<sup>2</sup>C-Bus slave address : read A3h and write A2h
- **32.768 kHz frequency output function**
  - FOUT pin output (C-MOS output ), CL=30 pF
  - 32.768 kHz clock frequency output. (Duty 50 ±5%)
- **Timer function**
  - Timer interrupt function can be set up between 1/4096 second and 4095 minutes.
  - It is recorded automatic to TF-bit at the time of event occurrence, and possible to output with /TIRQ pin output (N-ch open-drain output).
- **Interrupt function**
  - Alarm interrupt function, Time update interrupt function.

Pin Function

Signal Name	Input / Output	Function						
SCL	Input	Serial clock input pin						
SDA	Bi-directional	Data input and output pin						
FOUT	Output	FOUT pin outputs the reference clock signal at 32.768 kHz. FOE pin inputs the FOUT output control.						
FOE	Input	<table border="1"> <thead> <tr> <th>FOE pin input</th> <th>FOUT pin output (C-MOS)</th> </tr> </thead> <tbody> <tr> <td>HIGH</td> <td>Output (LOW)</td> </tr> <tr> <td>LOW</td> <td>OFF (LOW)</td> </tr> </tbody> </table>	FOE pin input	FOUT pin output (C-MOS)	HIGH	Output (LOW)	LOW	OFF (LOW)
FOE pin input	FOUT pin output (C-MOS)							
HIGH	Output (LOW)							
LOW	OFF (LOW)							
/INT	Output	Interrupt output (N-ch open drain)						
VDD	—	Connected to a positive power supply.						
GND	—	Connected to a ground.						

Terminal connection / External dimensions (Unit:mm)



Specifications (characteristics)

\* Refer to application manual for details.

Recommended Operating Conditions

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power voltage	VDD	—	1.8	3.0	5.5	V
Clock voltage	VCLK	—	1.6	3.0	5.5	V
Operating temperature	TOPR	—	-40	+25	+85	°C

Frequency characteristics

Item	Symbol	Condition	Rating	Unit
Frequency tolerance	Δf/f	Ta = +25 °C VDD = 3.0 V	5 ± 23 *	× 10 <sup>-6</sup>
FOUT output Duty	tw / t	Ta = -40 °C to +85 °C VDD = 2.4 V to 5.5 V	50 ± 5	%

\* Equivalent to 1 minute of monthly deviation

Current consumption characteristics

Ta = -40 °C to +85 °C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Current Consumption	IBK	fSCL = 0 Hz FOE = GND FOUT ; Output OFF (LOW)	VDD = 5 V	0.65	1.2	μA
			VDD = 3 V	0.45	0.8	
Current Consumption	I32k	fSCL = 0 Hz FOE = VDD FOUT ; 32.768 kHz Output ON CL = 30 pF	VDD = 5 V	8.0	20.0	μA
			VDD = 3 V	5.0	12.0	